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FOURTH ANNUAL REPORT

OF THE

STATE BOARD *of* HEALTH

OF THE

COMMONWEALTH OF GEORGIA

Transmitted to the Governor

January 1, 1908

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LETTER OF TRANSMITTAL.

COMMONWEALTH OF GEORGIA,
STATE BOARD OF HEALTH,
EXECUTIVE OFFICE, January 1, 1908.

To His Excellency, Hoke Smith, Governor of Georgia.

SIR: In accordance with the instructions of the State Board of Health of Georgia, I have the honor to herewith transmit to you the report of the Georgia State Board of Health for the year 1907.

The Board of Health especially instructs me to call attention to the scientific work that is being accomplished in its laboratories, particularly as regards the free examination of specimens for the germs that produce disease; this work is rapidly increasing, and is beyond question having a most beneficial effect on the health of the State and will in future result in still greater good.

We have continued manufacturing the substance known as "tuberculin," and it has been used quite extensively by physicians all over the State for the purpose of diagnosing tuberculosis in its earliest stages. It is gratifying to say that the results have been eminently satisfactory, and our work along this line will undoubtedly prove of much benefit. As this substance has been shown recently to be of undoubted value in the treatment of tuberculosis when properly used, we are also

4480

supplying it for this purpose, and it may be safely said that still greater benefit will be accomplished as a result of its employment in this way.

It is gratifying to be able to inform your Excellency that we are now prepared to give the Pasteur treatment for the prevention of hydrophobia, and that in future all persons within the State will receive the great benefits of this treatment without cost. We will either treat the patient here, or will send the vaccine to the physician and let it be administered to the patient at home.

We are also manufacturing diphtheria antitoxin, and will be prepared to furnish this free of all cost to the citizens of this State in whatever quantities desired in the course of the next few months.

Respectfully submitted,

H. F. Harris,
Secretary.

STATE BOARD OF HEALTH.

COMMONWEALTH OF GEORGIA, 1907.

President	W. F. Westmoreland
Vice-President	Charles Hicks
Secretary and Director of Laboratories	H. F. Harris

MEMBERS.

Dr. W. W. Owens	Savannah
Dr. A. P. Taylor	Thomasville
Dr. M. S. Brown	Fort Valley
Dr. J. H. McDuffie	Columbus
Dr. W. F. Westmoreland	Atlanta
Dr. Howard J. Williams	Macon
Dr. R. M. Harbin	Rome
Dr. Samuel C. Benedict	Athens
Dr. Giles Hathcock	Bellton
Dr. J. B. Morgan	Augusta
Dr. Charles Hicks	Dublin
Dr. H. F. Harris	Atlanta

Place of Meeting.—State Capitol, Atlanta, Ga.

Time of Meeting.—Tuesday following the first Monday January and June, at 10 a.m.

EXECUTIVE COMMITTEE.

Dr. Morgan, Chairman,
Dr. Hicks,
Dr. Owens,

Dr. Williams,
Dr. Benedict,
Dr. Taylor.

Assistant Director of Laboratories	Dr. C. R. Andrews
Pathologist	Dr. L. T. Pattillo
Bacteriologist and Chemist	Dr. J. E. Paullin
Clerk	Miss Florence Fryer

REPORT OF THE SECRETARY OF THE STATE BOARD OF HEALTH OF GEORGIA FROM JANUARY 1 TO JUNE 30, INCLUSIVE.

GENTLEMEN: I have the honor to submit the following report of work done since the last regular meeting of the board:

During the six months that this report covers I am happy to say that health conditions in Georgia seem to have been unusually good. In a few instances we have sent vaccine virus on request to the proper authorities in some of the counties, but the amount of smallpox is evidently very much less than was even the case during the preceding year. It looks as though all of those persons who have not been vaccinated have had the disease, and it seems likely that the malady will temporarily die out.

Following the instructions of the board, I visited, shortly after the last meeting, the Pasteur Institute in New York and familiarized myself with the method of manufacturing and administering the preventive vaccine against rabies. On investigating the matter it was found, however, that in order to carry on the work properly it would be absolutely necessary to build a cold chamber, and, as much more money was required than we could afford to expend out of the year's appropriation, I wrote the several members of the board asking as to whether I should go ahead and purchase the necessary apparatus on credit or leave the matter for future consideration; without exception, the members of the board replied that we should by all means wait until the money was appropriated by the Legislature for this specific purpose, and, as this has not yet been done, I regret that our work along these lines has not progressed further.

In this connection, it seems to your secretary that it would be highly desirable to add, in addition to the Pasteur treatment, the manufacture of diphtheria antitoxin. I have given the matter some study and believe that with the addition of one assistant both of these results could be accomplished, and in conversation with various members of the Legislature urged the appropriation of $3,000.00 extra for these purposes.

Recent developments, particularly here in our laboratories, have strongly impressed me with the probability that intestinal putrefaction plays a most powerful part in the production of chronic diseases of all kinds, and, as a consequence, it seems that the money of the State could be expended in no better way than in studying this very complex process. If we could get $2,500.00 or $3,000.00 I think we could secure the services of a couple of young men, one of whom could be trained to do the bacteriological and the other the chemical work that would be required in order to properly investigate this subject. If this should meet with the approval of the board I trust they will give their assistance in helping to secure this amount also from the General Assembly at the present session.

I believe that we could carry out all that I have suggested for $5,500.00 in addition to our regular appropriation.

Every year since I have had the honor to occupy the position of secretary of this board more or less complaints have reached me from northern parts of our State concerning the prevalence of the disease known as "milk sickness," causing a considerable amount of invalidism and not a few deaths in this region. With the permission of the board I would be glad to personally give the matter a little study during the coming fall, this being the time during which the disease prevails to the greatest extent.

Below is given the results of our laboratory work during the past six months:

	Positive.	Negative.
Ameba coli	2	2
Diphtheria	2	5
Gonococci	5	8
Tapeworm	3	2
Diplococcus intracellularis meningitidis	5	1
Tubercle bacilli	101	244
Malarial parasites	0	4
Larvae of fly	1	0
Hookworm	43	34

		Positive.	Negative.
Widal		13	18
Mucous colitis		1	0
Trichocephalus dispar		0	1
Rabies		0	3
Water analysis	3		
Totals	3	176	322

Doses of tuberculin	62
Total number examinations	501
Total number doses tuberculin	62

It will be noted that the number of examinations is somewhat less than during the time covered by the previous report; this is due to the fact that the latter embraced a period of seven months, and, further, that a considerable number of the examinations included in the previous report were made at our sub-laboratory at Albany.

Below follows a statement of the present financial condition of the board:

Expenses of January meeting:

Dr. Giles Hathcock	$ 12 00
Dr. Charles Hicks	19 76
Dr. M. S. Brown	15 85
Dr. W. F. Westmoreland	10 00
Dr. A. P. Taylor	29 25
Dr. H. J. Williams	14 76
Dr. R. M. Harbin	13 00
Dr. J. B. Morgan	21 65
Total	$ 136 27

Expenses of Secretary:

February	$ 178	35
May and June	136	00
Total	$ 314	35

Salaries:

Secretary and Director of Laboratories	$1,000	00
Assistant Director of Laboratories	500	00
Pathologist	280	00
Clerk	500	00
Office boy	120	00
Total	$2,400	00

Incidental expenses:

January:

Apparatus	$ 602	17
W. F. Westmoreland (services for 1906)	10	00
Typewriter	47	75
Honorarium "slow fever" work (L. T. Pattillo)	100	00
Medical directory	5	00
Dr. M. S. Brown (services rendered Harris Co)	12	16

February:

Safe	135	00
Vaccine	75	00
Stamps	10	00
Chemicals	7	53
Sundries	19	16

March:		
Lights in laboratory	12	50
Gas fittings	10	00
Honorarium "slow fever" work (F. W. Schnauss)	100	00
Stamps	10	00
April:		
Sign for laboratory	5	00
Towel supply from Dec. 1st to Apr. 1st	4	00
Book for laboratory	4	00
Vaccine	63	00
Sundries	9	62
Freight	1	65
Express	1	30
May:		
Annales Pasteur Ins. and books for laboratory.	246	32
Vaccine	10	00
Sundries	11	99
Stamps	10	00
Repair of chairs	2	50
June:		
Chemicals for March, April and May	21	90
Sundries	15	91
Dues to State and Province Boards of Health.	10	00
Apparatus	319	46
Freight	2	35
Stamps	10	00
Vaccine	10	00
Sundries	10	80
Total	$1,926	07

Expenses were then:

January meeting of board	$ 136 27
Expenses of Secretary	314 35
Salaries	2,400 00
Incidental expenses	1,926 07
Total	$4,776 69
On hand January 1, 1907	$ 60 93
Appropriated for 1907	7,500 00
Total	$7,560 93
Total expenses	4,776 69
Balance on hand	$2,784 24

REPORT OF THE SECRETARY OF THE STATE BOARD OF HEALTH OF GEORGIA FROM JANUARY 1 TO JUNE 30, INCLUSIVE

GENTLEMEN: I have the honor to submit the following report of work done since the last meeting of the board:

During the six months covered by this report the health of the State appears to have been fully up to the average. Smallpox seems to have almost completely died out, there having been only two requests for vaccine points since my last report was submitted to you.

I regret to report that no substantial progress has been made in the milk sickness investigation. We still have a cow and calf, with which our experiments can be continued during the coming year.

It gives me pleasure to say that the Legislature partially responded to the request of the board and increased our appropriation in the sum of $3,500.00, giving to us a total of $11,000.00 yearly.

I have made all the necessary arrangements for the beginning of the Pasteur and antitoxin work, and will be able to furnish diphtheria antitoxin and antirabic virus within the next month or so. I would call the attention of the board to the fact that we will certainly have a considerable excess of both of these products, and it occurs to me that we might, following the example of other boards manufacturing these substances, furnish them to persons outside of the State at such prices as would prove remunerative to us. I would, therefore, respectfully suggest that you confer upon me authority to do this.

In quite a number of instances during the past year I have received letters from health officers in various parts of the State asking instructions as to the technique of the various laboratory hygienic procedures, such as examination of milk, staining tubercle bacilli, etc. It seems to me that we could in all likelihood popularize our laboratory and at the same time be of service to the various cities and towns of our State if we would offer to such officers a free course in laboratory instruction. I would, therefore, beg your permission to in future inform them that they can be taught what is necessary without cost by coming to our laboratory and staying a sufficient length of time.

I would respectfully call the attention of your body to the great importance to the health of our State of the consummation of the plan of making a national park reserve of the remaining Appalachian forests. If these timbers are destroyed our streams will become practically unfitted for the purpose of furnishing potable water, and the result to the State would certainly be most disastrous. It seems to me that some action on the part of our board might somewhat assist in securing the coöperation of our congressmen in securing this all important measure.

Since the establishment of our laboratories it has constantly become more and more apparent that the space allotted us was not sufficient for our needs. It is likewise true that we have not a place properly lighted and ventilated for the keeping in a healthy condition all experimental animals, nor is there any space for a stable in which to keep horses for our antitoxin work. It is certainly highly advisable that some change be made, as we will certainly be able only with great difficulty to accomplish our ends under present conditions. The Governor has suggested that the board secure from the Legislature sufficient funds to construct a laboratory on the vacant space belonging to the State which lies back of the Mansion, and there is no question that if this could be done our laboratory facilities would be immeasurably improved. If the board approves of this plan, I would respectfully suggest that such measures be taken as will appear to be expedient in the matter. It will certainly be necessary to at once begin a vigorous campaign if we can hope to secure the desired appropriation within any reasonable length of time.

Pending the settlement of this question it will be necessary for us to arrange for the keeping of two or three horses. If they are kept at a regular livery stable, which, on the whole, I consider undesirable, the cost would probably be in the neighborhood of $50.00 per month; on the other hand, if we secure stables and have the janitor to look after the animals, I should say that the amount would be considerably less. It has occurred to me that the Atlanta College of Physicians and Surgeons might be willing for us to erect a temporary structure on the ground owned by them until our laboratories can be properly equipped for this purpose. I merely make this as a suggestion, as I have not consulted the faculty of the college concerning it, and do not know whether it will meet with their approval or not.

I desire to call the attention of the board to the following letter of Dr. Joseph Y. Porter, Secretary of the State Board of Health of Florida:

JACKSONVILLE, FLA.,
December 16, 1907.

*Dr. H. F. Harris, Secretary State Board of Health,
Atlanta, Ga.*

DEAR DOCTOR: I enclose you copy of a bill which the Florida delegation in Congress will introduce at this session, the merits of which are self-explanatory upon reading. May I bespeak for the measure your support and encouragement to an extent that will prompt you to enlist active co-operation from your delegation in Congress?

You will remember, Doctor, that I took this matter up at the last Conference of the State Board of Health with the Surgeon-General, and that in the discussion which followed my introduction of the subject, it was thought that special legislation must be had, for the Surgeon-General would have no authority to make a ruling, or, that if he had, he would probably be not inclined nor favorably disposed to do so, as it would entail some additional expense upon his department. I think, however, with a vigorous effort from the State Boards of Health through their congressional delegations, that the measure will be enacted into law, which will be of immense benefit to the people of the country, as it will give the State Boards of Health an opportunity to thoroughly distribute literature and bring into the home of almost every citizen such salient features of health administration as can be easily understood and also easily put into practice by the individuals themselves.

I shall be glad to have you acknowledge receipt of this and give me your views as to the feasibility or practicability of the measure.

Yours very truly,
(Signed) JOSEPH Y. PORTER,
State Health Officer of Florida.

An Act to extend the franking privileges to literature published by boards of health of States, Territories and Municipalities in the United States.

Be it enacted by the Congress of the United States:

SECTION 1. That it shall be lawful to transmit through the mail, free of postage, any printed letters, circulars, documents, pamphlets, and literature relating exclusively to the public health, which shall be issued by or under the authority of any Board of Health of any State, Territory or city in the United States.

SEC. 2. That every such letter or package to entitle it to pass free shall bear over the words "Public Health Business" an endorsement showing the name of the State, Territorial or Municipal Board of Health, as the case may be, whence transmitted. And if any person shall make use of any such official envelope to avoid the payment of postage on his private letter, package or other matter in the mail, the person so offending shall be deemed guilty of a misdemeanor and subject to a fine of three hundred ($300.00) dollars, to be prosecuted in any court of competent jurisdiction.

If this measure could be carried through it would certainly be of great assistance to us.

I might say that a plan was unofficially suggested to me by Dr. C. W. Stiles, chief of the Department of Zoology of the Marine-Hospital Service, by which a somewhat similar result to that suggested by Dr. Porter could be arrived at. Dr. Stiles thought that possibly the Surgeon-General of the Marine Hospital Service might, with the approval of the State Boards of Health, send out literature on the various diseases without cost to the States into which it would be sent. This plan would, of course, be of considerable service, but I would hardly think it so good as the suggestion of Dr. Porter.

I have had a communication from the representative of the Southern Railway in this city, who is extremely anxious that the Board adopt some form of permit for the transportation of corpses to, from and through the

State, and has submitted a blank form for your consideration. The railway has likewise submitted a similar form to the other boards of health of the States through which its lines pass—the idea being, if possible, to secure a uniform certificate. This is submitted for your consideration.

Below is given the results of our laboratory work during the past six months:

			Doubtful.	Positive.	Negative.
Tubercle bacilli				100	226
Diphtheria				4	14
Ameba coli				2	4
Gonococci				1	5
Tapeworm				2	9
Malarial parasites				0	8
Hookworm				32	28
Widal				19	25
Intestinal parasites				0	4
Pus cells				1	1
Ascaris lumbricoides				1	0
Spirocheta pallida				0	1
Oxyuris vermicularis				1	0
Rabies			1	3	3
Water analysis		13			
Tuberculin	375				
	375	13	1	166	328

Total examinations	508
Total doses tuberculin	375

Below follows a statement of the present financial condition of the Board:

Expenses of August meeting:

Dr. Giles Hathcock	$ 12 00
Dr. Charles Hicks	19 00
Dr. M. S. Brown	15 34
Dr. W. F. Westmoreland	10 00
Dr. H. J. Williams	15 72
Dr. R. M. Harbin	12 20
Dr. S. C. Benedict	14 38
Total	$ 98 64

Expenses of Secretary:

August	$ 61 30
September	42 15
October	37 20
Total	$140 65

Salaries:

Secretary and Director of Laboratories	$1,000 00
Assistant Director of Laboratories	283 33
Pathologist	350 00
Bacteriologist and chemist	133 34
Clerk	500 00
Office boy	120 00
Total	$2,386 67

Incidental expenses:

July—	
Freight	$ 4 80
August—	
Chemicals	6 40
Sundries	10 95
Stamps	10 00
October—	
Stamps	10 00
Sundries	17 80
November—	
Stamps	10 00
Stamps for mailing report	75 00
Stamps for mailing report	8 10
Total	$152 56

Expenses were then:

August meeting of Board	$ 98 64
Expenses of Secretary	140 65
Salaries	2,386 67
Incidental expenses	152 56
Total	$2,778 52

On hand July 1st, 1907	$2,784 24
Total expenditures	2,778 52
Balance on hand	$ 5 72

THE USE OF DIPHTHERIA ANTITOXIN.

On account of the prevalence of diphtheria in this State and the exorbitant price that is charged for diphtheria antitoxin, the State Board of Health will, on or about October 1st, offer for free distribution to all residents of this State antitoxin prepared at its own laboratories. This antitoxin will be made after the method of Gibson, which furnishes the greatest number of units in the smallest amount of serum. By this method also those protein constituents of the horse serum are eliminated that have in the past caused what is known as "serum disease," meaning by this the rash of an urticarial type, pain and swelling in some of the joints, together with occasional nausea and vomiting.

Dosage.—It is of the utmost importance in the treatment of diphtheria to give the antitoxin early in the disease. Occasionally where this affection is suspected, and there is no membrane present in the throat of the individual who has been exposed to it, but instead there is a congestion, it is wise to give at least 4,000 units of the antitoxin. Statistics collected by the State Board of Health of Massachusetts, showing the mortality when the antitoxin is administered on the first, second, third, fourth, fifth and sixth days of the disease, are given below:

Antitoxin given on—

First day....	1,433	cases, with a mortality of	7.9%
Second day..	3,284	cases, with a mortality of	6.2%
Third day...	2,654	cases, with a mortality of	9.0%
Fourth day..	1,687	cases, with a mortality of	12.9%
Fifth day...	864	cases, with a mortality of	15.9%
Sixth day...	1,242	cases, with a mortality of	17.6%

From this table one readily sees the absolute importance of administering the remedy early in the disease.

In giving the antitoxin, as a rule, an initial dose of 4,000 units is quite sufficient. However, if there is no shrinking of the membrane, nor a tendency to exfoliate in from four to six hours, 4,000 units should again be given. If there is an extensive membrane which covers the tonsil and uvula when the patient is first seen, 8,000 to 10,000 units should be given at once and repeated every four to six hours until there is shriveling of the membrane, diminution of the nasal discharge, and a general improvement in the condition of the patient. The reason the mortality in this section of the country is so high from diphtheria is because of the fact that antitoxin has not been, as a rule, used early enough and not in sufficient doses.

Administration.—The antitoxin should be given in the subcutaneous cellular tissue of the back near the angle of the scapula. Under no conditions is it wise to give it in the subcutaneous tissue, either of the leg or arm, for the simple reason that occasionally with the best care and the strictest aseptic precautions abscess will form, and in the regions above mentioned, when such occurs, it dissects beneath the fasciae and becomes difficult to treat. Occasionally the antitoxin has been injected in the subcutaneous tissue of the abdomen; this, however, causes discomfort to the patient, and on this account it is preferably given, as above stated, in the back.

On account of the expense incident to this work, the State Board of Health has given positive instructions that all syringes sent out from this laboratory must be returned after the use of the antitoxin. Under no conditions will other antitoxin be supplied to any physician unless the above instructions are absolutely complied with.

THE PREVENTIVE TREATMENT OF HYDROPHOBIA.

This disease, as it occurs in man, is practically always conveyed by the bite of some animal—the dog being the usual offender. The poison is present in the saliva of the diseased animal, and is transmitted through wounds made by its bite.

As observed in the dog, there are two types of the disease; one, the *furious;* the other, the *paralytic.*

In the *furious* type of the affection the animal first appears to be restless and somewhat excited. He seeks dark places and apparently prefers to be by himself. In this stage of the disease the dog's appetite is good, and may be excessive; he responds to orders although his attention can be attracted only for a moment at a time. As the malady progresses the animal becomes more and more restless, and develops a desire to tear those things about him into pieces. There is described a peculiar bark at this stage of the disease; instead of ending as it ordinarily does, it is prolonged, and terminates in a higher-pitched note simulating a cry. This is supposed to be very characteristic at this stage of the affection. The appetite gradually diminishes, food is refused, and swallowing becomes difficult. As the symptoms gradually progress the dog shows signs of delirium, and begins to wander. As a rule, he goes about with the tail hung, mouth wide open, and with a wild look in his eyes, biting, as he goes, anything that happens to be directly in his path; seldom does he turn aside to disturb anything or anybody. In the later stages of the disease paralysis generally develops, beginning in the hind legs and soon involving the body. If the animal be now carefully observed it will be seen that he can not swallow. There is no dread of water, as the name "hydrophobia" implies, and as is commonly thought, the animal often attempting to drink, but owing to the paralysis of the muscles of the throat this is impossible. Inability, then, to swallow either water or solid food is one of the surest and most reliable signs of rabies. Weakness becomes very marked, and the animal finally lies down in a stupor and dies. The entire course of this type may last from six to ten days; generally it is four or five.

The *paralytic* type of the disease occurs in fifteen or twenty per cent. of the cases. The onset is, as a rule, the same as that observed in the furious type. Instead, however, of the dog beginning to wander, as previously mentioned, the animal becomes paralyzed. The paralysis first affecting the muscles of the jaw, later of the tongue. As is the case in the furious type of the disease, the animal loses the power to swallow both solids and liquids, but has no fear of water. The mouth remains wide open, the tongue protruding, and an abundant amount of thick saliva exudes. The animal remains quiet, does not attempt to bite any animal or individual. Death occurs on the second or third day of the disease.

Precautions.—When an individual is bitten by an animal, either supposed or known to be rabid, the wound should be immediately cauterized with some caustic, preferably concentrated nitric acid. This should be applied without fear, because it is safer to use too much than too little. In case this is not available, any strong caustic may be used. Punctured wounds should be laid open with a knife and the surfaces freely cauterized. It should not be forgotten that the slightest scratch from the tooth of a rabid animal may lead to the development of hydrophobia in man, and it, therefore, behooves all persons bitten by dogs to take every possible precaution. Even though the animal at the time may appear to be healthy, some strong antiseptic should be applied to the wound and the animal carefully watched until all possibility of his having the disease has passed. Many persons have died from slight wounds inflicted by animals appearing at the time to be perfectly well. Attention should also be directed to the fact that wounds where the teeth of the animal pass through the clothing are not so dangerous as those where no such protection intervenes. Bites about the face and head are much more frequently followed by rabies than those inflicted on the extremities, and, of course, where wounds are deep the chances of infection are much greater; where injuries of the latter kind are inflicted it is practically out of the question to thoroughly cauterize them, and the patient should immediately receive the Pasteur treatment. It is probable that if thorough cauterization be not done within five minutes that it can not be relied on to prevent the development of the disease; where there is any doubt the only safety lies in the Pasteur treatment. After having attended to this the animal inflicting the wound should be caught, isolated and allowed to die. *Under no conditions should the animal be shot unless absolutely necessary. After death the head of the dog should be removed, packed in a sufficient quantity of ice to keep the specimen cold, and expressed at once to the laboratory of the State Board of Health.* The necessary examination can then be made and the presence or absence of rabies determined. A report will be furnished of the findings, either by mail or telegraph, as requested.

Treatment.—Since the epoch-making researches of Pasteur, laboratories have been installed in various parts of the world for the purpose of making vaccine by means of which it is possible, by gradual immunization, to prevent the development of hydrophobia in persons bitten by rabid dogs. This is done by a series of injections of a weak virus prepared according to the directions of Pasteur. This treatment is now given free of charge by the Georgia State Board of Health, and those people residing in this State may have it either at this laboratory or the vaccine will be sent to their local physician who can administer it at home. *It is absolutely necessary that the vaccine sent out be injected at once after its receipt, as it will not keep even a day.* The injections should be given with a sterile syringe. After having thoroughly shaken the bottle the contents are aspirated into the syringe, and the same injected in the subcutaneous tissue over the abdomen, as shown in Figure 1. The skin should be thoroughly cleansed with 50 per cent. alcohol, or some germicide, before giving the injection. As the duration of the treatment varies from three to four weeks, different portions of the abdomen widely separated should be selected for each injection. Gradually toward the end of the treatment a slight local reaction occurs about the point of inoculation. This is treated, should it occur, after the same manner as one treats an ordinary cellulitis. *It should always be remembered that no harm can come from the treatment,*

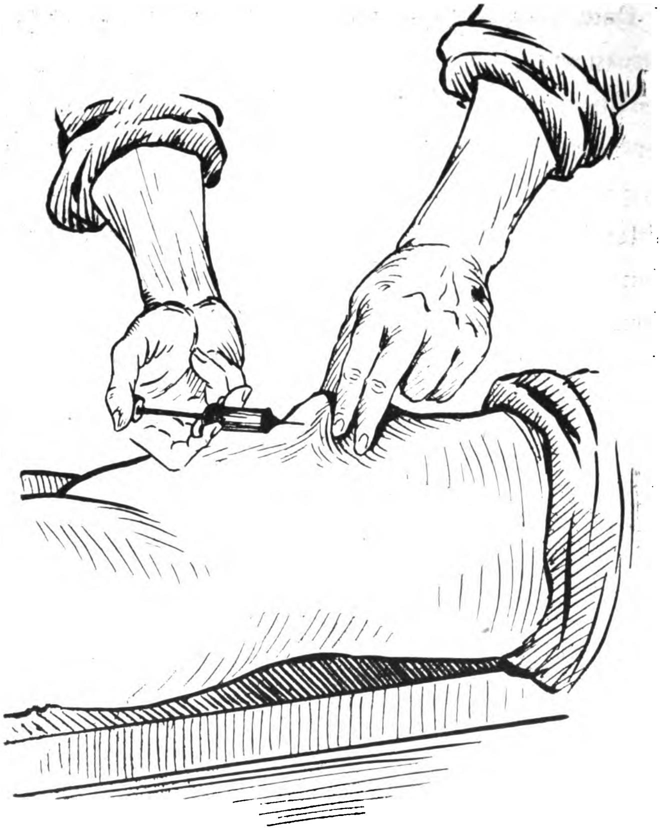

FIG. I.

whether the patient is bitten by a rabid dog or not, and that in all cases of doubt no hesitation should be felt in resorting to it.

The following information is required of those applying for treatment away from this office:

I.—Name and age of the patient.

2.—Date, location and severity of the bite or bites with treatment.

3.—Any information bearing on the probability as to whether the animal inflicting the bite was or was not rabid.

4.—A brief report of the patient's condition two weeks after the end of the treatment.

The dose will be marked on each bottle.

Unless the history of the patient is promptly furnished treatment will be discontinued.

TUBERCULIN—ITS MANUFACTURE AND USES.

A tremendous sensation was created in 1890 by the announcement of the discovery by Koch of a substance since known as "tuberculin," but at that time generally spoken of in this country as "Koch's lymph." An impression was at first created that a specific had been discovered for that most dreaded of all diseases—tuberculosis—but it was soon found that the wild expectations of the laity, and even of the medical profession in a measure, were without justification. The conduct of Koch himself—one may say rather fortunately—hastened scientific criticism, and certainly in no small measure contributed to the reaction that so quickly followed against this much vaunted remedy. In the beginning, when there seemed a certain amount of justification for the opinion that tuberculin would prove a real specific in consumption, it had been the intention of Koch to patent, or keep secret, the process of its manufacture, and to tax the rest of the world for Germany's scientific acumen. It was a great conception—one that would have enriched the fatherland at the expense of all other nations had it materialized, but the idea was one utterly repugnant to the scientific spirit, and richly it deserved failure. In part justification, however, it may be urged that in Germany it is permissible for a scientific man to patent his ideas and derive a revenue from them.

Clinical observation, which is the only way of determining the value of a remedy, quickly showed that not only did tuberculous individuals not improve from the injection of tuberculin, but that in many instances positive injury resulted. Under such circumstances there could, of course, be but one result; the leaders of the medical profession unanimously condemned the drug, and a reaction set in against it quite as pronounced as the enthusiasm that welcomed it. However, those who unconditionally condemned it occupied a position very near to those who had assumed too much for it, because both were speaking without careful and painstaking investigation of its merits—in a word, neither were scientific. After the excitement subsided careful, accurate and unbiased investigators took up the matter with a view of arriving at the real facts, and from their experiments this desirable result appears to have been accomplished.

Before speaking of the diagnostic and therapeutic applications of tuberculin, attention should first be called to the method of manufacture of this substance—

meaning the old tuberculin of Koch—and to also refer to the modifications made by its discoverer, and by others. To all intents and purposes the original tuberculin is an extract of the tubercle bacillus, and is prepared in the following manner: The tubercle bacillus is grown at 37 degrees centigrade on ordinary peptone bouillon to which 5 per cent. glycerine has been added. It is important that the bacilli be made to float on top of the liquid, as, if they sink, on account of the scarcity of oxygen in the deeper portions of the medium, practically no growth occurs. We should always, therefore, carefully place the organisms on the surface of the liquid, and avoid shaking until the growth has completely covered over its surface. The vessel in which the organisms are grown should not be more than one-half full of the culture medium, and free access of oxyg should be allowed by not stopping the mouth of t container too closely. If the temperature be kept 37 degrees, and if air be admitted with sufficient freedom, the bacilli, after they begin once to grow, develop with considerable rapidity so that the top of the liquid may become covered over in about two weeks under very favorable conditions; oftentimes, however, the growth occurs more slowly, and it is several weeks before this degree of development is reached. After the surface of the medium has been completely covered with the organisms the final steps in the manufacture of the tuberculin may begin. The fluid with the bacilli is first measured, and the quantity recorded, after which the mixture is boiled for from one-half to three-quarters of an hour. The liquid is then filtered through a Berkfelt filter into a sterile vessel, and evaporated down to one-tenth of the original volume. It is then tested as follows: A guinea pig weighing from 250 to 300 gms. is given an injection of virulent tubercle bacilli one month previously, and this animal now receives 0.5 c. c. of the tuberculin in the same way. If the tuberculin is up to proper strength the animal dies within thirty hours with symptoms of inflammation around the tuberculous lesions found in its body.

A dose of tuberculin is so small that it is necessary to dilute with some liquid in order to get a sufficient bulk. Ordinary sterile water may be used, but it is much better to employ an equal mixture of 0.5 per cent. carbolic acid solution and 0.85 per cent. of common salt in water.

More recently Koch has devised a number of other tuberculins.

One of these is a tuberculin made by extracting tubercle bacilli with a 1/10 normal soda solution—the resulting extract being called "T A;" this gives reactions in every way similar to those produced by the older tuberculins, but has the disadvantage that it produces abscesses at the point of injection.

Koch early recognized the desirability of injecting not only the extract from the bacillus, but the entire organism itself, inasmuch as unquestionably certain substances remain in the germs after making the decoctions already referred to; these constituents it appeared highly probable should in some way be secured in the material to be injected in order to produce a perfect immunity. Of course, the living organisms could not be used, and experiments showed that even when killed they were not absorbed after being injected in the tissues, and they furthermore produced suppuration or the formation of nodules; this action of the organism is probably the result of the presence in their covering of unabsorbable fatty acids. In order to overcome these difficulties Koch thoroughly dried young cultures of virulent bacilli and then ground them up into an impalpable powder in a mortar, the process being carried on until only a few of the bacilli remain uncrushed. As the organisms are not previously killed, it certainly appears a little dangerous to employ a fluid containing in suspension any of the bacilli still not thoroughly broken up. For the purpose of avoiding this source of danger Trudeau places the dried bacilli in a cylinder with a number of pieces of porcelain, and then seals the chamber at the opening where the contents are introduced; then, by suitable mechanical appliances, the cylinder is turned over rapidly for seven days, at the end of which time it is stated that not a single unbroken bacillus can be detected. To the crushed bacilli distilled water is added and the whole centrifugated for from a half to three-quarters of an hour at 4,000 revolutions per minute. At the end of this time there is found an opalescent fluid in the centrifuge tube which is poured off and is called "T O." To the sediment that remains in the tube more water is added and the process of centrifugating again carried out; this is repeated until no sediment remains. The different portions of liquids, with the exception of the first, are then added together and are called "T R."

The "T O" contains practically the constituents of the bacillus that are found in the old tuberculin, and resembles the latter in its action on the human being. On the other hand, those portions of the bacilli present in the "T R" represent the constituents that more particularly act as immunizing agents when introduced into the living organism.

More recently Koch has abandoned the "T O" and "T R" tuberculins, and has simply used a mixture consisting of equal parts of water and glycerine containing in suspension the entire bodies of the crushed bacilli; the mixture is set aside for several days and the clear supernatant fluid is poured off from the sediment that is now present in the bottom of the container. The proportions of this preparation is such that 1 c. c. contains 5 milligrams of pulverized tubercle bacilli. This is called "New Tuberculin Koch (bacilli-emulsion)."

It is of more or less interest just at the present time to recall the fact that many years ago Koch prepared a so-called refined tuberculin which was made by precipitating the albuminous substances from the old tuberculin with 60 per cent, alcohol, and washing the precipitate with pure alcohol; it is then dried and dissolved in water. A tuberculin consisting of one part of the dried powder to 100 parts of water, as recently suggested by Calmette, furnishes an easy method of making the tuberculin test in children by placing a drop of the liquid in the eye of the suspected individual.

Following E. Buchner, who suceeded in pressing from some of the lower vegetable forms a sort of cell juice, H. Buchner and Hahn have secured a similar fluid from the tubercle bacillus. Young cultures of tubercle bacilli were filtered from their culture media, and mixed with sand, the whole well rubbed together and later subjected to a pressure of from 400 to 500 atmospheres. The resulting fluid, known as tuberculoplasmin, is a clear amber-colored liquid, which is rendered free of all bacteria by being passed through a porcelain filter, and is finally preserved with 5 per cent. common salt and 20 per cent. gylcerine. It does not appear that this variety of tuberculin possesses any advantages, and has not come into anything like general use.

Among tuberculin experimenters there is a more or less well-founded belief that those preparations requiring heat in their manufacture are not so satisfactory as those in which this is not necessary. There seems, then, some reason for the suggestion made by Denys that the most satisfactory tuberculin should consist simply of filtered bouillon in which the organisms had been allowed to grow. The dosage of the liquid would, of course, be about ten times that of the ordinary tuberculin, and it is said that a number of the best workers on the subject of tuberculosis in America now employ this preparation in preference to the older one of Koch.

There are some other tuberculins, but as they have never proven of any particular value, a description of them seems superfluous.

At the present time the original tuberculin of Koch is perhaps employed more frequently than any of the newer preparations, and, on account of the fact that it is impossible for tuberculosis to be accidentally transferred by means of it, it should be, and is, generally regarded as the most satisfactory of all of the different forms of the substance. Koch's "bacilli-emulsion" and the simple bouillon of Denys are also frequently used for therapeutic purposes.

Tuberculin for diagnostic purposes: There can be no question that great aid is oftentimes rendered by the administration of tuberculin in making a diagnosis in the early stages of tuberculosis. The basis on which the procedure rests is that a normal man can receive by injection without the slightest effect 10 milligrams of tuberculin, while those suffering from tuberculosis in any form have fever, a feeling of malaise, and pain in the back and limbs in from ten to fifteen hours after a much smaller dose; the symptoms just referred to are spoken of as constituting a "reaction." It should, however, be mentioned that those who have advanced tuberculosis, or who have suffered from the disease for a long time, are not so susceptible to the action of the drug as those who have the malady only to a slight degree and who have been recently attacked. We, therefore, can not regard a negative result as being absolutely conclusive that the patient has not tuberculosis, as, taking them altogether, perhaps not more than 60 per cent. react. Many writers recommend as much as 5 milligrams of the old tuberculin as the first dose for purposes of diagnosis, but inasmuch as this quantity of the drug frequently produces most violent symptoms, of the kind already described, we follow Trudeau in recommending a very small dose to begin with, and gradually increasing up to the maximum dose of 10 milligrams. In the majority of instances patients that react at all will do so with the first or second dose. We give for the first dose 0.5 milligram, for the second 1 milligram, for the third 2 or 3 milligrams, for the fourth 5 milligrams, and for the fifth 10 milligrams, repeating the last dose in some instances if thought necessary; the injections should be given at intervals of at least two or three days. The best time to administer the drug is late in the afternoon or evening, as we can then on the following morning begin to watch the symptoms that result in case the reaction is positive. The injections should be made wi a sterile syringe, and the needle, instead of being mere introduced under the skin, as in ordinary hypodermic i jections, should be pushed directly down into the muscle beneath the subcutaneous cellular tissues. Perhaps the best site for the injections is the back or the buttocks, as in either of which situations the muscular tissues are near the surface and the slight soreness that frequently results does not very seriously interfere with the patient's movements. It is, of course, advisable to cleanse the skin with some antiseptic just before introducing the needle. If the patient's temperature has been running normal an elevation amounting to one-half degree is looked upon as being of positive significance.

Reference was made to the fact that Calmette has recently employed the alcohol-precipitate from tuberculin dissolved in water and placed in the eye of the suspected individual as a means of diagnosis. This was suggested by the observation of von Pirquet, who noticed with children a little ordinary tuberculin rubbed into some part of the skin previously scarified as for vaccination was rapidly followed by evidences of inflammation in the part in case the subject had tuberculosis; if the child was healthy no result was observed. lmette modified this procedure by simply making a per cent. watery solution of the precipitate of albumens om tuberculin and instilling into one of the eyes of the patient a single drop of this. In from three to eight hours hyperemia of the mucous membranes of the eye follows in tuberculous individuals, with a sandy feeling and more or less lachrymation; the inflammatory process in the conjunctiva reaches its height in from twelve to twenty-four hours, and remains for several days; at the end of about a week the eye usually returns to a normal condition. That this test is sensitive and very convenient there can, of course, be no two opinions, but, as might have been expected, in some cases it is followed by very severe inflammation in the eye. So far as is known no instance has been recorded where the eye was lost as a consequence, but the reports that have been made to the present time would indicate that this is not impossible. Under such circumstances it is doubtful if this method should be employed, as even the possibility of putting the patient's eye out should warn us against the procedure.

Therapeutic uses of tuberculin: Recent investigations have pretty clearly shown that tuberculin, in addition to being a valuable diagnostic agent, is also of considerable importance from a therapeutic standpoint. It is believed by all those who have used it in very minute doses in chronic tuberculosis that their patients have been more or less improved in consequence, and, as no instances have been recorded where harm was done under such conditions, the matter is certainly worthy of the consideration of every physician. The point made, particularly by Trudeau, who is one of the best of all authorities on the subject living or dead, is that the drug should be given in very small doses, the quantity, so far as is possible, being always sufficiently small not to produce a perceptible reaction. It is perhaps safer to begin with 0.01 of a milligram, though, as a rule, we might without danger start with 0.05 of a milligram. These injections are made once every three or four days, and the amount of the drug cautiously and carefully increased. If the patient's temperature should go up in the least following the injections the next dose should be smaller. If he presents the slightest evidence of not doing well, as shown by malaise, headache, mental irritability, anorexia or increased cough, the injections must be at once stopped. On the other hand, if the patient continues to improve no hesitation may be felt in continuing the use of the drug, gradually increasing it until finally a considerable dose, even as much as from ½ to 1 c. c., may be administered. There should, however, be no rule about this, as the final amount, as well as the quantity given in the beginning, has to be the result of closely watching the peculiarities of the patient, exhibiting the drug in such quantities and at such intervals as may seem to be attended by benefit, and decreasing it or stopping it altogether if the patient appears not to be doing well. If the "bacilli-emulsion" be used the beginning dose should be from 0.001 to 0.002 of a milligram. The injections should be, of course, given in the same way as for diagnostic purposes. In conclusion, it may be said that there is every reason to believe that we have in tuberculin, when properly employed, a safe means of diagnosticating tuberculosis in its early stages, and that if given properly, it is of decided therapeutic value. Here, however, as in all other things connected with medicine, the physician must use his brains and not a pocket formulary—the drug must be used according to the requirements and susceptibilities of the patient.

The State Board of Health furnishes tuberculin to all practicing physicians of this State free of cost, and it may be obtained in any desired dose by requesting the same by letter or telegraph. It should particularly be borne in mind that the required dose must be specified, as it would only be possible for the physician in charge to know how to prescribe for the patient intelligently.

It should, of course, be understood that in no instance does the State Board of Health advise treatment of tuberculosis individuals by tuberculin alone. At best it can only be considered as an aid in this way, and should *be used always in connection with the fresh air treatment.*

PELLAGRA.

This curious disease was first described by Thierry in 1755, and shortly afterwards by Cosal. Since this time large numbers of observers have written on the subject, particularly Lombroso, Gemma and Tuczek—the last named particularly having given a very full and complete account of the malady. The word pellagra means raw skin *(pelle agra)*, and is intended to describe one of the most characteristic symptoms of the affection. The disease seems first to have appeared in Spain, about 1735, and soon thereafter in Italy. At a still later period it was discovered in France and Roumania, and very recently cases have been reported from Austria, Russia, Poland, Egypt, Mexico and Yucatan. In the United States it was first described by the writer in 1902.*

Since this time the malady has been observed in at least two asylums in the South, but as to whether or not reports have been made of these cases I can not say. Since the writer's original case he has observed several others, all of which presented the typical symptoms of the disease, and there can no longer be the slightest doubt that the malady is one that is not infrequent in the South. A thorough investigation of the inmates of the

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***Transactions of the Georgia Medical Association, 1902, page 220, and in *American Medicine*, June 19, 1902.**

various state asylums and all their records would certainly show that a large number of persons have suffered from the disease.

Below is given the histories of those instances of the malady observed by the writer:

Case No. 1.—M. W., age twenty-nine; unmarried, a farmer; was first seen on March 8, 1902. He was born in Appling county, this State, and has always resided there. His father died between sixty and seventy years of age of what was probably sarcoma, though concerning this nothing can be said definitely. His mother died at the age of sixty-three of paralysis. He has two brothers and one sister; the sister and one brother have never been in good health, but neither of them has ever had any serious malady so far as is known.

The patient was brought up in rather unusual poverty for this part of the country, his father having died when he was quite young, and since that time he has been forced to labor for his livelihood. His bread has always been prepared from Indian corn, and this has constituted his principal diet since infancy. The corn from which this bread was made has always been raised upon the farm upon which the patient labored, and he asserts that so far as he is aware it was never harvested in an unripe state, but feels sure that it was not always well protected during the winter, and that it was probably frequently wet as a result of the driving rains that are very common in the South during the fall and winter seasons.

The patient asserts that he was perfectly healthy until about fifteen years ago, when he began to observe that in the latter part of the winter and spring he has never been so well as in the summer and fall months. This has gradually grown more marked, until within the last few years his condition at these periods has been extremely bad. In the fall and early part of the winter he feels strong and vigorous, and weighs usually about one hundred and thirty pounds, but last spring his weight went down to ninety-eight pounds, and he was, during this period, very anemic and extremely weak. The exact time at which these attacks come on somewhat varies, but is usually from January 15 to February 15, after which he grows worse and worse until May or June, and then begins to improve, so that by the end of July or early August he is generally practically well again. He states that last spring his condition was worse than ever before.

The first symptoms usually begin in the spring with loss of appetite, thirst, and a feeling of malaise, all of which rapidly increase until in from six to eight weeks he is entirely unfit for labor of any kind. At these times he suffers to an extraordinary degree from melancholia, and freely asserts that he would much prefer death than to live on in his diseased condition. His legs become extremely weak, and he himself calls attention to the fact that sensation to pain over his whole body, but especially in the lower extremities, is much below normal.

He complains that all of his food tastes very salty, as the result of which he takes unusual quantities of water. He frequently has sudden sensations of heat over the entire body, varying sometimes with a feeling of chilliness; the former is much more common and pronounced than the latter, being oftentimes present to such an extent that he has a strong desire to immerse his body in cold water. In the spring, at the time when he begins his labors in the fields, his hands and arms and dorsal surfaces of his feet become greatly inflamed, blisters form in considerable numbers, followed by the formation of scabs in the affected areas. He suffers greatly from constipation, and has a strong distaste for food, particularly for bread made from Indian corn. During his sick periods he complains of a constant pain in the neck, and of tenderness and pain in the region of the stomach. He particularly complains of vomiting very frequently, this following immediately upon the ingestion of food. He has never vomited blood.

Present condition: With the exception of skin eruptions he complains at present of all the symptoms above described.

The patient is five feet six inches tall, and weighs one hundred and seventeen pounds. Both in walking and in sitting down he stoops decidedly. His hair is of a sandy color, the skin over the entire body is extremely pale, and especially in the face is thrown into numerous wrinkles. The skin seems to be somewhat thinned, is quite smooth and very dry; on the face, neck, hands and lower parts of the arms it is very much pigmented, being colored of a brownish hue, but there is at present no indication of an eczematous condition. He has very little beard. The fingers are somewhat clubbed and the nails are curved inward. The mucous membranes are, like the skin, extremely pale. The tongue is moist, shows indentations of the teeth, and its epithelium appears to be, in a large measure, absent. The teeth are small and quite a number of them are decayed. The pulse averages 90, respiration 20, and the temperature 98° F. On removing the patient's clothing he is found to be somewhat emaciated, and the entire body presents the extremely pale condition already referred to. Over the heart a soft, blowing systolic murmur is constantly heard, and varies very greatly in intensity at different times; sometimes it is heard loudest in the mitral area, while at others it is here scarcely perceptible, but is distinctly audible in the pulmonary artery zone, and can generally be distinguished in the region of the tricuspid. On percussion the heart is found to be normal in size, and the lungs present no abnormality. In the right mammary line the upper border of the liver corresponds to the lower margin of the fourth rib, and extends well downward to the lower border of the ribs. Just below the ensiform cartilage, and to the left of this, there is great tenderness. The stomach, however, appears to be of the usual size, and its position, as determined by inflation, seems to be normal. After an Ewald trial meal the total acidity of the extracted contents was found to be 64, HCl. 40, combined HCl. 4, phosphates 16. Neither the spleen nor the intestines present any abnormality. The feces were of a dark brick-red color; on microscopic examination a great number of eggs of the ankylostoma were found. The urine is somewhat increased in amount, there being about 2,300 c.c. excreted in twenty-four hours on the average. The urine was of a light yellowish red color, its specific gravity 1012, and its reaction faintly alkaline. No sugar was detected, but at one time a faint ring of albumin with the ferrocyanide of potassium and acetic acid test was found; albumose was not present. The urea excreted in twenty-four hours amounted to 21.15 gm., chlorides 3.15, phosphates 2.37 gm., and sulphates 2.82 gm. On microscopic examination a few epithelial cells were found in the urine, and a solitary very hyaline cast; this cast was probably not a true one, and doubtless belonged to that class of bodies called cylindroids that are sometimes encountered in the urine. On examination the number of red blood-cells was found to be 1,760,000, the white cells 4,020. The blood only contained twenty per cent. of hemoglobin. The red blood-cells present decided, though not extreme poikilocytosis, and there are a number of microcytes and macrocytes. A few nucleated red cells were encountered. A differential count of the white cells after staining by

Ehrlich's method showed the cells present in the following percentages: Small lymphocytes, 28 per cent.; large lymphocytes, 14 per cent.; transitional cells, 6 per cent.; polymorphonuclear leukocytes, 50 per cent.; eosinophiles, 2 per cent.

His eyes were kindly examined for me by Professor Roy, who has sent the following report of the condition found: Vision R. eye, 15/20; L. eye, 15/30. Vision in both eyes made normal by placing a minus glass of 1/2 diopter before each eye.

Retinoscopy shows 1/2 diopter of myopia in each eye.

Pupils in both eyes react well to both light and accommodation.

Perimeter shows practically a normal field with the exception of a slight contraction on both nasal and temporal sides in both eyes, more marked in the right.

In both eyes the optic discs appear pale and very indistinct in outline. They look almost as if there might be a beginning gray atrophy. Throughout the retina the choroidal pigment causes the fundus to take on the appearance almost of a retinitis pigmentosa. The blood vessels appear normal.

From the foregoing it is seen that this patient presents all of the typical symptoms of pellagra, a disease which is now generally believed to be the result of eating fermented Indian corn. If this be a genuine example of the disease, it is the first case of the kind that has ever been

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reported in the United States, though instances of it have been observed in Central America.

This patient was successfully treated for his hookworms, and improved decidedly during the succeeding summer and fall. In April of the following year he wrote me that his symptoms had recurred with the erythema on his hands and face quite marked. During the latter part of the summer and autumn he again improved, but was attacked again in the following spring, this time having more or less diarrhea added to his other symptoms.

When last heard from the patient stated he was in a very miserable condition, and it is doubtless true that he is long since dead, as I have not heard anything further from him.

Case No. 2.—C. P. C., age sixty-three, female, white, widow, native of Georgia, was first seen January 24, 1907. Family history: Father died of "indigestion." One sister and one brother of dysentery, and one probably of apoplexy. Past history: About seven years ago, while living in Milledgeville, Ga., the patient had an attack of bowel trouble lasting a few months. She was sent to Rockbridge, Va., and was much improved from a course of alum waters of that place; continuing this treatment after her return home she was finally apparently cured. Since this, however, she has had occasional attacks of diarrhea lasting from two to five weeks. At these times most of the trouble comes on from

10 p.m. to breakfast time on the following day; during this period she would have from one to eight stools—sometimes copious, and occasionally containing bloody mucus; no tenesmus. No history of indigestion.

Habits: Does not eat hot bread with butter. Takes one cup of coffee in the morning, but has not taken tea for five years. She eats much fruit, but not much sweets. She has false teeth, but chews well.

Present history: Present trouble began in November, as one of the attacks above described. A week or so later her mouth began to get sore, followed two or three weeks later by a similar condition of her throat. She was also affected with a like trouble in the vagina, accompanied by a whitish exudate.

Also suffered with salivation, some nausea and vomiting, and when first seen by Dr. Adams was having about twelve stools in twenty-four hours. During the last week the number has decreased to between two and three. She passes very little mucus, but no blood. The stools were greenish-brown in color, moderately soft and very offensive; movements very copious. No tendency at present for bowels to move during the night. There is no tenesmus. She has lost much flesh. General appearance anemic and moderately emaciated; skin and mucus membranes pale; tongue red on top and all around the edges; along the frenum it is covered with a whitish membrane. Some membrane also on the mucus surface of the cheek. Both mouth and tongue very tender.

Pulse, 80; respiration 18; temperature, 99 to 100; blood, hemoglobin 85 per cent.; white cells, 20,500.

Feces whitish in color and very foul; reaction acid; some bloody mucus present. On microscopical examination a few pus cells were found, but no amebas or other protozoan parasites. Hydrobilirubin present.

Physical signs all normal; liver appears not to be atrophied. Mucosa of labia and vulva contains whitish patches similar to those on tongue. Skin on back of thumbs and first three fingers of both hands is very red—evidently being inflamed; a similar condition is present between the thumbs and forefingers, at which site there is a small scab on the right hand.

The patient died February 25th. Before death her mind became very feeble, and toward the end was almost in constant delirium, sometimes low and muttering and then noisy. Her temperature just before death ran from 100 to 103.

Case No. 3.—Mrs. K., age twenty-seven, female, white, married, native of Georgia; occupation, housewife; first seen February 2, 1907.

Past history: She had an abscess of the right lung from getting a watermelon seed in the bronchus. This occurred when a child, and her recovery was complete. Typhoid seven years ago. She moved to Nashville, Ga., three years ago. Some time after this she suffered from "indigestion," accompanied with formation of gas, and looseness of the bowels, especially at night and in the early morning. Shortly afterwards she got better.

The trouble again grew worse in November, 1906, at which time she had diarrhea, accompanied by slight fever.

Present history: Since the above date she has suffered from diarrhea, having two to eight stools daily. She still complains of gas formation in the stomach and bowels, and of indigestion. Her mouth has been very red and ulcerated a number of times. It is now better, but still much inflamed and between the back molars of lower jaw the gums are somewhat ulcerated; it was impossible to tell how extensive this lesion is, as the patient could not be made to open her mouth sufficiently. Has pain in throat. Suffers from occasional attacks of dyspnea. Vomits often. Persistent vaginitis. Her husband, who is a physician, says there is no ulceration. The skin of the hands has become inflamed a number of times, and is at present red and scaling on the back as far up as the wrist. Nervous symptoms severe. Occasionally she has slight clonic spasms. Mind dull and the memory is very much affected. She is much emaciated. Pulse weak and rapid—ranging from 90 to 136. Respiration, 20 to 32; temperature, 98 to 100; tongue reddish at edges, and denuded of its epithelium to a great extent; is slightly coated in the middle. Lungs, heart, spleen and lymph nodes normal. Liver dullness extends from the seventh rib to the lower border of the ninth.

Feces: Reaction neutral. Dark (bismuth) and very offensive. No amebas or eggs of parasites. No blood or mucus. Hydrobilirubin present. Blood not obtained.

Urine: Specific gravity 1030; reaction acid; albumin and sugar negative; indican not increased; both uric and hippuric acids present. The patient died February 6, 1907.

Case No. 4.—W. K., age 16, female, white, schoolgirl, native of Georgia; first seen May 9, 1907.

Family history: Negative.

Past history: Negative.

Present history: In February or March a year ago present trouble began as a general decline. Had eczema on back of hands, forehead and neck. She suffered from amenorrhea. In June her bowels began to run off; no blood or mucus was present. She suffered from griping and frequent desire to go to stool. Her mouth was sore all during July, and this condition still persists with remissions and exacerbations from time to time. During October, November, December, January, February and March her bowels were regular. About a month ago her bowels began to run off again; there was an average of three movements in twenty-four hours, occurring mainly in the forenoon. Stools are copious, and greenish or whitish in color. Belches frequently. Her general appearance is good. There is some acne on face. Tongue is red and bare. Teeth good. Pulse, 94; respiration, 18; temperature, 99.

[illegible]

and felt fairly well during the fall and winter months.

Present history: During the spring just passed there was a recurrence of the symptoms noticed during the early months of the previous year, the diarrhea having become very decided toward the end of May and first of June. There is a typical erythema on the back of the hands and wrists, with a slight ulceration in the center of the red area on the right hand. There is a slight erythema on the prominence caused by the protrusion of the cheek-bone.

Physical examination: On physical examination nothing was found abnormal except that the liver was slightly diminished in size. There was no ulceration in the mouth, but the patient complains of more or less soreness at times. The tongue is bare of its epithelium, it seeming to have been shed off. There are slight elevations on the tongue that look like minute blisters. This patient has no susceptible loss of sensation, and has not complained of articles of food tasting salty. For the last month or so a slight cough has existed with more or less purulent expectoration. All of the internal organs appear to be normal as far as can be determined by physical examination. This patient is now under treatment.

Case No. 6.—Mrs. H., age thirty-two, native of Georgia, first seen June 29, 1908.

Family history: Negative.

Past history: Patient was always well up to the beginning of the trouble with which she has recently suffered.

Present history: In the spring of 1906 the patient first noticed that her health was not up to the normal; this, however, was followed by no other symptoms until the following year, when at the corresponding period she began suffering from more or less indigestion, followed by loss of flesh and weakness. Diarrhea began in May, and continued until the latter part of September. During this period the back of her hands and wrists and her face exhibited the typical erythema of pellagra. She vomited a great deal during her illness. Under rest in bed and a milk diet she gradually improved, and is now well, though the back of her hands and face are more or less pigmented. This patient was not seen by the writer during her illness, but her symptoms were related to him by the lady herself and her physician, Dr. J. B. Camp, of Carrollton.

SYMPTOMATOLOGY.

The symptoms of the affection vary so greatly that Lombroso has not inaptly said that "there is no disease, there are only sick persons." All writers seem to agree that the symptoms vary, depending upon the locality, the character of the corn eaten, and racial peculiarities. Tuczek has described three stages of the malady, each of which, of course, insensibly merges into the other.

In the *first stages* there is a greater or less length of time during which prodromal symptoms appear. The patients commonly feel for several preceding winters lack of energy without apparent cause, and more or less mental depression; they not uncommonly complain of irregular pains in the head, in the spinal column, or in other parts of the body. During the spring and early summer these symptoms gradually disappear so that the patient toward the end of July or August feels fairly well again. This condition of affairs goes on for a greater or less number of years, and is followed by the

Second stage: During the middle of the winter the patient loses his appetite, though in some cases the opposite condition is present; there may be also intense thirst or a distaste for liquids. It has been observed that there is often a very strong distaste for food prepared from Indian corn. There occurs, not uncommonly, heart-burn, pyrosis and pains in the different parts of the body. At this period of the disease the tongue is coated. The region of the stomach is swollen and more or less tender. Diarrhea is not uncommon, though constipation is sometimes present.

Third stage: In the final stage of this disease numerous nervous symptoms occur in addition to those already referred to. There are pains in the head, particularly in its posterior portion. A feeling of uncertainty and pressure in the head, vertigo, noise in the ears, sleeplessness; in some instances decided somnolence, pain in the back, head and in the spinal column, weakness and uncertainty in movement, particularly in the limbs; there is often a sensation as though there was a lump in the throat with more or less choking. At the height of the disease reflexes are more or less increased. There is also a mental irritability, loss of memory, inability to think, lack of desire for physical and mental exertion, and very commonly the patient sinks into a condition of more or less profound melancholia.

As the name indicates, we commonly find in the latter stages of the malady a peculiar erythema on the exposed surfaces of the body, particularly on the back of the fingers, hands and forearm, and not uncommonly on the face. The tongue, which is in the beginning coated, now loses its epithelium and presents an appearance closely resembling that seen in sprue.

If the patient survive the attack he begins to improve in the early summer, and by July or August is generally again back in a more or less normal condition. Those parts of the skin that were inflamed during the height of the attack generally, however, continue to show more or less pigmentation for a considerable period of time.

As the disease progresses the patient becomes more or less anemic, and motility is seriously interfered with by a progressive weakening of the muscles. Sensibility is likewise affected. Paranesthesia, and more or less anesthesia, are not uncommonly observed, while pains in the various parts of the body are frequently complained of.

There is often weakness of the eyesight, double vision, musculae volitantes, sensitiveness to light, and alterations in the optic nerve. Ophthalmoscopic examinations sometimes show other grave changes within the ball, cataract being particularly common. The pupils are sometimes enlarged, more seldom contracted.

The taste is also perverted, the patients very commonly complaining that everything eaten tastes very salty. This symptom is so common in Lombardy that the affection is there known as salso, and in Spain as flema saliva.

The vasomotor nerves are not uncommonly more or less affected, leading to undue redness in some parts of the body, particularly the nose, and the œdema in favorable situations.

The skin irritation has already been referred to. This becomes, in many instances, so prolonged that it leads to the formation of ulcers in the affected regions.

The nails show the effect of bad nourishment. Nervous symptoms play a prominent part in the disease, often causing the unfortunate sufferer to be sent to an asylum for the insane. The patient suffers from a profound melancholia, with various delusions, which not uncommonly take on a religious character. Sometimes they attempt suicide, particularly effecting self-elimination by drowning. The patient is very stupid as a rule. This melancholia is in the beginning more or less periodical, but at a later time becomes continued and profound, ending only in the death of the unfortunate patient.

The pulse and temperature in the beginning of the disease remain normal, but toward the end the former becomes rapid and the latter shows elevations; in some instances there supervenes a condition* which, from its resemblance to typhoid fever, has been called *typhus pelligrosus,* which usually terminates fatally in from one to two weeks.

The quantity of hydrochloric acid is diminished except in the very early stages of the malady.

The quantity of urine is diminished.

Lombroso has found that chlorides, and particularly the phosphoric acid, are diminished.

Albuminuria is occasionally encountered.

If the disease occurs in the very young, as is the case in hookworm disease, development is greatly hindered.

Pellagra is a disease which is often greatly prolonged; in some instances the fatal termination occurs in three or four years, in others it may be ten or fifteen years, or even longer.

ETIOLOGY.

The investigations of a large number of observers have shown beyond all reasonable doubt that pellagra is the result of eating improperly cured Indian corn. The disease, then, is in the nature of an intoxication, resembling ergotism in its etiology, and also somewhat in its symptomatology. It is a matter of the utmost importance for our farmers to see to it that their corn ripens thoroughly, that it is not stored until it is absolutely dry, and that it should be so protected from the weather and dampness that those changes that occur in it, by means of which the pellagra poison is produced, can not result.

The total number of cases of this disease in Georgia to-day can not be calculated, but that a great number exist there can be no question, as the disease is one that produces a long period of invalidism, great suffering, and, in many cases, finally death, it certainly behooves those who are responsible to use every possible precaution to prevent the corn-fermentation that produces it. The exact nature of the changes that produce the poison in the corn have not as yet been determined.

PATHOLOGICAL ANATOMY.

The bodies of those dead of this disease are extremely emaciated. The heart shows, in many cases, brown atrophy, less commonly fatty degeneration. Endocarditis is sometimes encountered. Not uncommonly the aorta is atheromatous. The liver is frequently enlarged with fatty degeneration; sometimes brown atrophy is observed. The spleen is, as a rule, small. The kidneys show cirrhosis. The wall of the intestines, as a consequence of the atrophy of its muscular coat, is greatly thinned; the mucus membrane of the rectum and colon oftentimes show the presence of small ulcers. There is frequently found hyperemia, anemia and œdema of the brain and spinal cord; similar changes occur in the meninges with evidence of active inflammation in many cases.

Other cases carefully investigated by Tuczek show that the posterior columns of the cord were the seat throughout of a systemic degeneration, this being particularly marked in Goll's column. In six of these cases there was disease of the pyramidal tract. Curiously in every instance the central canals of the cords were completely obliterated. Dejerine has also demonstrated degeneration of the nerves of the skin in this disease. This was not confirmed by Raymond or Tuczek.

DIAGNOSIS.

The principal difficulty in diagnosticating this affection lies in the ease with which, in the later stages, it may be confused with sprue. The clinical pictures of the two diseases are very similar indeed, and cases undoubtedly occur in which it would be impossible to decide the true nature of the malady with absolute certainty. In pellagra the history of the case, the incidents of the symptoms during the end of the winter and their subsidence in July or August, and at a later time the skin eruption and the profound melancholia that usually comes on in the latter stages of the affection, would together serve to make a diagnosis clear. Unfortunately we have no laboratory methods by which it would be possible to arrive at a conclusion.

PROGNOSIS.

The prognosis of pellagra is extremely bad. Recovery can only be hoped for when the patient is seen early and is warned as to character of the disease from which he is suffering.

PREVENTION AND TREATMENT.

The prevention of pellagra, of course, lies in avoiding fermentative changes in the corn used for food. Only those varieties of corn should be grown that ripen fully before frost occurs, and the utmost caution should be used to prevent its housing until it is thoroughly dry. A failure to observe these rules will bring much unnecessary suffering and many deaths to those neglecting them. Not only is the meal made from this fermented corn poisonous, but it is said that whisky prepared from it is capable of giving the disease to those who drink it.

As to the treatment, of course, the first essential is to forbid the patient to eat articles of food made from corn; unfortunately it is usually the case that when the patient is first seen the disease is, as a rule, so far advanced that this precaution is of but little avail. The medical treatment should be a symptomatic one. For the cerebral symptoms Lombroso has recommended tincture of coculus indicus in doses of from five to ten drops;

as the dose of this preparation of coculus is generally put down as from one to four drops, it would be perhaps better to begin with a smaller dose. Cerato has advised the employment of airol in doses of about one-half grain three or four times a day for from one to two weeks. For the itching and burning of the inflamed skin, cold baths, followed by applications of two per cent. carbolic acid, or four per cent. carbolic acid salve have been recommended; cocaine salve, one to three per cent., menthol liniment, camphor and chloral hydrate have also been used as local applications. As a general tonic Lombroso has used arsenic, beginning with five drops of Fowler's solution and gradually increasing the quantity to the point of tolerance.

TROPICAL APHTHA OR SPRUE IN GEORGIA.

H. F. HARRIS, M.D., ATLANTA, GA.

Tropical aphtha, or sprue, is a disease which was first described by Hillary in 1776, his observation on this affection having been made in the Antilles. Since that time the malady has been found in most of the tropical countries of the world, and even in some subtropical regions. As to whether the disease has been recognized in this county in the past, I am at a loss to say, as I have not had access to the literature.

My work on this subject extends back a number of years—my first case having been seen in January, 1901.

No report was made of this for the reason that the patient had previously to his illness lived for a time in the West Indies, and I was not absolutely sure therefore that the disease had its inception in this country. This case, with another, was reported in *American Medicine* for July, 1906. Since my report on these two instances of the disease several others have been seen, but these, with one other, will suffice to illustrate the principal clinical features that characterized the disease, and to direct your attention to the fact that this very serious affection is not uncommon in our State, and, as it is only curable when a diagnosis is made early, its recognition becomes, therefore, a matter of great importance.

The clinical histories of these cases are as follows:

Case No. 1.—L. G. M., age thirty-two, white, male, a native of Georgia, a dental student, was first seen on January 15, 1901. His family history is negative, except that one sister had had an exactly similar disease to the one the patient complains of; this sister has always lived in Boston, Ga.

Past history: During childhood, the patient had whooping-cough, measles and mumps. Ten years ago he had chills and fever; he also had malaria seven years ago. He never had syphilis, but ten years ago he had a bad case of gonorrhea. He had typhoid fever ten years or twelve years ago.

Habits: He uses tobacco; both smokes and chews. Before he was sick he drank moderately.

Present history: Present trouble was first noticed about six years ago while the patient was in his home, Boston, Ga., but previously he had spent two years in the West Indies. First symptoms noticed were that movements from the bowels were loose, but the number was not increased nor was blood or mucus observed in the stools; no pain was present at this time.

More recently the trouble has slowly progressed, there being periods during which there were many loose stools passed in twenty-four hours, while at other times the number is normal; often the movements were of natural appearance. As the trouble gradually grew worse some pain was felt in the umbilical and hypogastric region at times. He has had backache a good deal. Sometimes, perhaps once or twice a month, or once in several months, there has been blood, and occasionally mucus, in the stools.

Toward the latter stages of the disease, the patient complained of great weakness, dizziness and staggering, and shortness of breath not influenced by exertion. His feet are at times tender, but never swollen. His appetite is always good, but after eating he complains of a tight feeling in the abdomen. He gradually became greatly emaciated, and at this period was very melancholy. Toward the end his mind was greatly affected. With the progress of the malady the number of stools gradually increased.

On first examination the patient was found to be in a fairly good condition, but was later greatly emaciated. The skin was never very pale, and in the later stages of the disease became of a muddy brownish hue. The pulse, temperature and respiration were normal at first; later the pulse was rapid, but no elevations in temperature were ever noted. His tongue is small, very red, fissured and generally without any coat at all; the filliform papillæ seemed entirely absent. Later sores developed on and under the tongue—the borders being principally affected; these ulcers come and go. Ulcers also formed from time to time on the buccal mucous membrane, on the roof of the mouth and between the last molar teeth on both lower and upper jaws—the last being known in India as Crombie's molar ulcers; these ulcers usually presented a reddish appearance; more rarely they are covered by a slight whitish pellicle. Toward the later states of the malady the patient's mouth was so sore that mastication was difficult, and, doubtless as a result of sores in the pharynx and esophagus, swallowing was very painful.

The heart, lungs and spleen appeared to be normal. There was in the beginning slight diminution in liver dullness; in the later stage of the disease the dullness extended from between the seventh and eighth ribs above down to within about 4 cm. of the costal margin in the right nipple line. No other abnormality could be made out in the abdomen. Rectal examination showed no ulcerations of the mucosa of the gut.

The urine was examined a number of times, and, excepting only that the quantity was diminished, no abnormality was found.

The feces were pale, frothy and exceedingly offensive. Reaction, acid.

No parasites or ova were found. Neither blood nor pus were ever detected.

A short time before death there were 3,200,000 red and 10,050 white cells to the cu. mm. of blood. Hèmoglobin, 65 per cent. The patient gradually grew worse and I learned that he died toward the end of the year 1904.

Case No. 2.—J. C. G., age fifty-four, male, white, native of South Carolina, a woodman, was first seen May 20, 1905.

Family history: Chills when a boy. Bowels had been loose from time to time for last twelve or fourteen years; when the trouble began he was living in Laurens county, Georgia. For two years he has lived in Pretoria, Ga. For a long time in the beginning he was troubled with slight morning diarrhea at irregular intervals, accompanied by flatulence and eructations. Since October, 1904, his bowels have never been natural at any time.

Habits: Since attaining manhood has indulged in occasional sprees, but in the intervals takes no alcohol in any form. Uses tobacco.

Present history: For seven months he has had diarrhea constantly, which has gradually grown worse. No griping or pain until a short time before death, when he had pain in bowels during exacerbations. Toward the end of his illness the bowels acted from fifteen to twenty times in twenty-four hours; movements came in paroxysms, possibly half a dozen in an hour, followed by periods of rest. In the later state of the disease, hiccough was common, and there were spells of nausea and vomiting. The patient was melancholy, and toward the end his mind became very feeble.

The notes that follow apply to the patient's condition during the latter months of his life.

He was frightfully emaciated. Skin was somewhat pigmented, mucous membrane pale. The face was shrunken, and he had a vacant expression.

Tongue small and very red; filiform papillæ absent. At this time minute superficial erosions occurred upon its surface. No sores of buccal mucous membrane were complained of; no pain in the throat on swallowing. The tongue was practically never coated, and when so there was only the merest trace toward the back.

Respiration normal when first seen; later toward termination reduced to 8-10 per minute.

Temperature practically normal. A few times during exacerbations has gone to 101 degrees F. A short time before death it was 97.2 degrees at 2 p.m.

Red blood cells, 3,430,000; white, 11,800; hemoglobin, 75 per cent. Count of white cells resulted as follows: Polymorphonuclear leukocytes, .75; small lymphocytes, .18; large lymphocytes, .06; eosinophile, .02⅔.

Feces foamy, thin, watery and brownish in color; sometimes clots of blood were present. Odor was very offensive. Food of all kinds now passed undigested. Reaction, acid. No amoebæ or other parasites. No ova. Hydrobilirubin present.

Urine normal, though quantity was diminished.

No tumor in abdomen. Tenderness was always present between the umbilicus and pubes. He complained of burning pain in this region extending to the back. In the right mammary line liver dullness begins at upper margin, seventh rib, and extends to upper margin of the ninth rib. Heart, lungs and spleen normal. No pain in throat or neck. Rectal examination negative as regards ulcerations, but considerable tenderness present.

The patient died March 2, 1906.

Case No. 3.—M. B., age twenty-two, female, white, native of Georgia; single; first seen May 12, 1906. Family history, negative. Past history: Her present trouble began at about the age of three with diarrhea, which has continued since. The stools vary from one to four in twenty-four hours; the average now being two. She suffers intensely with griping and bearing down pains during exacerbations. The stools are very copious and are generally watery in consistency, and of a whitish color; no blood was ever found. When the stools are very frequent whitish mucus is often passed. She had some small intestinal parasites during 1905—supposedly pinworms. She had occasionally had fever, the temperature sometimes going to 101 degrees F. Her temperature is usually 99 degrees, or over. She has always been much worse in summer in every way. At present she looks fairly well, but up to this winter was terribly emaciated. Suffers from slight tenderness in bowels. Great quantities of gas form in the intestines. Stomach is often distended, and she suffers from heartburn after eating. Tongue gets sore and raw during exacerbations. Gives a history of having suffered about a year ago from some trouble in the arms, which was probably a neuritis. Her mind has not been entirely normal since this attack. She is a resident of Hart county, Georgia.

In general appearance is anemic, but fairly healthy. No emaciation. Skin and mucous membrane rather pale. The tongue was not coated. There remains some epithelium, but the surface is rather bare on the whole.

Pulse, 86; respiration, 18; temperature, 99.4.

Blood: Hemoglobin, 60 per cent.; red cells, 3,600,000; white, 9,300; polymorphonuclear leukocytes, 63.2; large lymphocytes, 17.9; small lymphocytes, 18.7.

Feces offensive, very white, faintly acid. Leukohydrobilirubin present.

Urine normal.

Stomach contents: Only 15 c. c. were obtained. Total acidity 60 HCl. 20, CHCl, 12, acid salts, 29.

Physical signs: Liver begins in right mammary line at upper border of fifth ribs and extends to lower border of sixth. Abdomen shows nothing abnormal. Spleen, heart and lungs and abdomen appear to be normal. Kidneys in normal position. Under the treatment hereafter to be described the patient rapidly improved and was apparently well when last heard from, some six months after she was first seen.

SYMPTOMATOLOGY.

From the foregoing it is seen that the clinical features observed in these cases correspond very closely with those that characterize this malady in other parts of the world. Here, as elsewhere, the affection comes on most insidiously, there being in the beginning more or less dyspeptic disturbances followed by a tendency to diarrhea, which is, as a rule, most common in the early morning hours, with periods during which the patient improves followed by exacerbations; the disease slowly increases in severity, and in the course of a greater or less length of time finally becomes so grave that the unfortunate victim suffers a continued diarrhea, loss of strength, emaciation and ultimately sinks into a condition of mental and physical asthenia followed by death.

As the disease progresses the patient's skin becomes very muddy and oftentimes shows pronounced pigmentation. Swelling of the extremities is sometimes observed. One of the most characteristic features of the malady are the ulcers which develop both under and on top of the tongue, on the buccal mucous membrane, and on the gums, particularly between the last molars; ulcers are also sometimes observed on the pharynx. It is a marked peculiarity that the surface of the tongue is stripped of its epithelium coating—the surface becoming smooth and presenting a raw appearance; in the last stages the organ is more or less atrophied. As the disease advances the liver becomes very much decreased in size.

The stools have been, in every instance of the disease seen by me, of an acid reaction, a characteristic which was first pointed by Thin. Bile pigments were found in the stools in every case seen. In no instance have I detected the eggs of parasites, nor have the embryo of the strongyloides been present.

The temperature in this disease shows no great variation from the normal until the fatal termination is approached when fever varying from 99 to 103 is commonly found to be present.

The pulse is at first undisturbed, but as the affection progresses, considerable rapidity is the rule.

Salivation is pronounced in some cases.

Mental disturbances are usual in the later stages of the malady, the patient sinking gradually into a state of profound melancholia. Ulceration of the labia and vagina in women seems common in sprue as seen here—particularly in the later stages.

In two cases of the disease seen since this paper was prepared, there was complete achylia gastrica; both were in women and comparatively recent.

While the foregoing represents the course of events in a typical case of sprue, attention should be directed to the fact that in many instances the disease does not begin in the characteristic way, thus we find that it may supervene directly upon dysentery, being apparently a sequel of this disease. I have seen recently a case of this kind. It is also stated by Manson that sprue may follow acute enterocolitis, though I have never personally observed this.

All writers call attention to the fact that there occurs what may be regarded as incomplete sprue. Thus instances are seen in which the disease seems limited to some particular portion of the gastrointestinal tract.

Thin recognizes three distinct types; the form in which the lesions are principally found in the mouth and throat; the variety in which intestinal symptoms predominate and in which the mouth is affected only in the later stages; and lastly that type in which the disease pursues a very chronic course—being found usually in elderly persons or those who have lived for a long time in the tropics. The last form of the disease is also encountered in those who first show symptoms of the malady after considerable periods of time after having returned to Europe.

The disease in tropical countries seems to vary in duration from one to two to from ten to fifteen years. With but one exception, the disease as seen by me was of long duration, and even in this instance it lasted nearly three years; it seems likely that the acuter forms of the malady do not occur in our climate, though this is a matter which only future observations can determine.

The disease, as it occurs here, appears to differ in no essential feature from the affection as seen in other parts of the world. Noteworthy, however, are the facts that my patients have not suffered from such marked dyspentic disturbances as writers on the tropical form of the malady say is common, nor are the stools so uniformly of a whitish color, or so copious. It is very curious that in all of my cases where death occurred the final termination was preceded by a considerable period of time during which the patients lost almost complete control of their mental faculties.

It is noteworthy that inflammation of the skin of the back of the hands and of the face would appear not to be unusual in the later stages of the disease, as it occurs here—a peculiarity that I have not seen mentioned by foreign writers.

Etiology: Space does not permit a complete discussion of the etiology of this disease. As a matter of fact, its causation is not understood, though it seems very likely that it is not a parasitic disease. It is certainly not contagious, nor does it occur in epidemic form.

At one time was believed that the anguillula stercoralis was the etiological factor in this disease, but more recent investigation has entirely disproved this theory. No bacterium has been definitely associated with the malady, and it may be likewise stated that the same may be said concerning protozoan parasites.

There appears to be no doubt that diseases that are of an exhausting nature predispose to sprue; among these may be mentioned dysentery, diarrhea, hemorrhoids, fistula, frequent child-bearing, prolonged lactation, exhausting discharges, syphilis, enterocolitis and bad hygienic surroundings.

Manson, who is the greatest authority on tropical diseases, says: "Personally, I am inclined to regard sprue as an expression of exhaustion of the glandular structures subserving digestion, the result of overstimulation by certain meteorological conditions which are found in tropical countries, and which are unsuited to the European constitution. The remarkable effect of physiological rest, as supplied by 'the milk treatment' in curing sprue, seems to support this hypothesis." This view is also supported by my recent observation of achylia gastrica in two cases of sprue in the early stages.

PATHOLOGICAL ANATOMY.

The most marked peculiarity of sprue consists in that there is atrophy and disappearance of the epithelial coating of the entire gastro-intestinal tract—the mucus membrane being gradually eroded, and finally disappearing.

Superficial ulcers are also sometimes found on the surface of all parts of the intestines, giving rise to the mucus and blood that are occasionally found in the stools. Cyst-like dilations of the crypts containing a muco-purulent material are also encountered. A marked peculiarity consists in the fact that the entire coat of the intestine is greatly thinned, this being particularly true of the muscular layers. The submucosa shows hypertrophic fibrous changes in some situations. The mesenteric glands are often enlarged and pigmented.

The liver undergoes gradual atrophy and finally becomes very small.

Unfortunately, I have been unable to secure a post-mortem in any of my cases where death occurred, and I can not, therefore, say anything concerning the pathology of the affection from personal observation.

For the foregoing facts concerning the morbid anatomy of sprue, I am indebted to Manson, Scheube, Thin and other writers on tropical diseases.

DIAGNOSIS.

A diagnosis in well-developed sprue is very easy; the morning diarrhea, the dyspentic disturbances, the ulceration of tongue, gums, lips and buccal mucous membrane, the white, frothy, copious stools, and gradual emaciation furnishes a clinical picture which could hardly be mistaken. As the disease advances all of the foregoing symptoms increase in severity, and we have, in addition, atrophy of the liver, loss of strength, profound anemia, and greatly disordered mentality.

In the early stages, particularly in those where mouth symptoms predominate, the affection may be mistaken for syphilis, but the knowledge of the possibility of such an error should be quite sufficient to avoid it.

I have known in one instance of a very capable physician mistaking the condition for simple catarrhal stomatitis. It should be remarked that the disease might be mistaken for a mercurial inflammation of the mouth.

The writer some years ago called attention to the presence of a case of pellagra originating in Georgia. Since that time he has had an opportunity of seeing a number of cases of this disease. The differentiation from sprue is sometimes very difficult, the writer himself having made this error in several instances.

It would appear that pellagra, as it exists here, differs principally from sprue, particularly in the latter stages, by the presence of an eczematous-like eruption on the back of the hands, and sometimes on the face, and by very profound mental disturbances. In the early stages of the disease a diagnosis would often be impossible.

At the time that this paper was corrected for press, a case was seen in which it would have been very easy to have mistaken it for pernicious anemia, and it was only after a most careful examination of the blood and the patient's symptoms that a conclusion was finally reached. May it not be that these two diseases are closely related and are both dependent upon digestive errors?

PROGNOSIS.

The prognosis in sprue is always grave and leads certainly to death if the affection be not recognized and properly treated in the early stages. Four out of five cases seen by me have died and one recovered. The cases with fatal terminations were seen in every instance after they had existed for a considerable period, and all were in the last stages of the disease.

Treatment: The treatment of sprue is essentially hygienic, writers on this subject practically all agreeing that drugs are of no avail.

Of the methods employed, the combined milk and rest treatment is the one which has proven most successful. It is carried out as follows:

The patient is given a dose of castor oil and is put to bed, receiving no food until the bowels have thoroughly acted. In the beginning sixty ounces of milk are given in twenty-four hours, and as improvement occurs the quantity is gradually increased to three quarts, and even more if it continues to agree with the patient. In some individuals more than eighty or ninety ounces of milk produce indigestion; in these cases the patient may secure an increased amount of nourishment within the bulk tolerated by having the milk evaporated to the extent desirable, or by adding condensed milk.

Patrick Manson, the great founder of tropical medicine, especially insists that milk be given in moderate quantities, frequently repeated, and above all, he lays stress upon the necessity of taking the milk with extreme slowness. It should be sucked through a small glass tube, or taken through an infant's nursing-bottle, the latter being the preferable way. It may be noted at this point that the bad repute into which the milk diet has more or less fallen is undoubtedly in a large degree due to the fact that patients are not instructed to take it slowly. The average man drinks it very much as he does water, and under such circumstances it is little wonder that it produces indigestion.

Under this treatment, if the case be not too far advanced the movements are, as a rule, quickly reduced to the normal frequency and consistency. The *patient should remain in bed for at least a week* after this result has been accomplished, and he should continue upon a strict milk diet *for at least six weeks;* it is of the greatest importance that these two precautions be observed since a failure to do so entails with almost absolute certainty a relapse, and then the patient has to go over the entire treatment again. It is desirable that the patient remain practically at rest throughout the entire course of treatment. After six weeks have elapsed, and the bowels remaining normal, we may begin slowly and cautiously to add other articles of diet—in the beginning egg albumen, soups containing small quantities of starch well cooked, arrow root, and still later a gradual change to a full diet may be permitted. At any time during this period if the patient shows the slightest tendency to digestive disturbances, irregularity of the bowels, or if the mouth begins to get sore, he must at once be put back to bed, a dose of oil administered, and the treatment with milk resumed just as in the beginning.

Thin recommends that crumbs of well-cooked stale bread be the first addition to the milk diet, rather than the articles mentioned in the foregoing description; an ounce is given, and if this agrees with the patient it is repeated for three days, and if it still be well borne, a similar quantity is given twice daily, and if still no disturbance is produced an equal amount is administered thrice daily. If the patient continues to improve the quantity of bread is doubled, and after a week the amount still further increased. Butter may be eaten with the bread. This writer warns against the giving of eggs early, stating that he has seen relapses occur as a consequence in several cases. Thin considers boiled fish an excellent addition to the milk and bread diet when the proper time arrives.

In some instances patients do not do well on the milk treatment, and under such circumstances it has been found that beef juice is sometimes well borne. Unfortunately the quantity of beef necessary is considerable—from twelve to twenty pounds being required daily. The juice is expressed and administered to the patient in the raw state.

In some cases, curious as it may appear, sprue has been relieved by an exclusive fruit diet even where the milk treatment has failed. The patient is given fruits of all kinds in quantities sufficient to allay hunger, and this is kept up until the bowels return to a normal condition. It is only exceptionally, however, that it is necessary to resort to this plan of treatment, and it is highly probable that it would be successful only in a very small percentage of cases.

In some cases whenever the patient attempts to return to solid diet dyspeptic disturbances are encountered. Under such circumstances a change from an albuminous to a farinaceous diet, or vice versa, may be of benefit. Manson recommends under such conditions what is known as the "Salisbury cure." This consists in giving to the patient a diet of meat and warm water. The meat should be of a good quality and free from fat and gristle, and should be well cooked. Small quantities are given in the beginning and gradually increased to three pounds daily if it be well borne. Warm water, amounting to four pints in twenty-four hours, is likewise given; it is taken before going to bed and on rising in the morning, and also about two hours before meals—never at meals. This treatment is persisted in for six weeks, and then is gradually changed to an ordinary diet.

In instances where diarrhea is extreme opium may be resorted to, but its action is always temporary and never curative, and should, therefore, be dispensed with at the earliest possible moment.

All writers on the subject of sprue agree that a patient attacked with the disease should move to a cooler climate, but all are equally unanimous in the opinion that it is of the greatest importance that the patient should avoid getting chilled. For this reason it is advised that flannel be worn next the skin during the treatment, and for even a year after; it is particularly important to cover the abdomen well. Tobacco must not be used while the patient is under treatment.

In concluding this matter I wish most earnestly to insist upon the necessity of an early diagnosis in cases of this kind in order that treatment may be instituted before extensive organic changes occur in the gastro-intestinal tract. The treatment, if begun early, is highly successful—if late, it is usually without beneficial effect, and, though the patient may be temporarily somewhat improved, death is the inevitable result.

Except tuberculosis there is perhaps no other disease in which an early diagnosis is of such transcendent importance.

FREE LABORATORY EXAMINATIONS.

Character of Examinations.—The Laboratory of the Georgia State Board of Health has been established with the primary object in view of assisting physicians in diagnosticating those diseases that are caused by bacteria or animal parasites. It would be desirable to include also examinations of urine and of tumors, but the appropriation at present given us is not sufficient to allow this to be done. It is to be hoped that in the future a more liberal policy will permit this work to be added to that already being carried out.

The following examinations are made:

Examinations for bacteria: Examinations of this kind are conducted in two separate ways. Where the organism that is being searched for is usually found in much greater numbers than other germs incidentally present, or where we have specific stains for the bacterium in question, examinations are generally made by a direct inspection with the microscope of the material under investigation. In those cases where the germ that is being searched for does not fulfill either of the requirements just referred to, the diagnosis must be made by planting the germs on some culture medium. In instances where this is to be done the germ which is being looked for is finally isolated by the process known as "plating," or, in a few instances, this result may be accomplished by sowing the material on some special culture media that has the property of causing the germ in question to grow with so much greater rapidity than other bacteria that they are very soon present in overwhelming numbers. As examples of these different possibilities we may mention the *micrococcus intracellularis* which represents the first, the *tubercle bacillus* the second, and the *diphtheria bacillus* the third; thus, if we wish to examine the cerebrospinal fluid for the germ of meningitis, it is only necessary to precipitate the cellular elements present in the liquid by means of a centrifuge, and to then place the sediment upon a slide or cover glass, dry, stain and examine; if we wish to examine for the tubercle bacillus, we have only to place the suspected material upon a slide or cover glass, and dry and stain according to one of several methods which are practically specific for this organism; lastly, if we wish to examine for the diphtheria organism it is best to plant the suspected matter on Leoffler's blood-serum-glucose-bouillon medium, and at the end of from eighteen to twenty-four hours we examine any growths that may be present in the usual way.

The specimens that are to be examined directly may be either sent to the laboratory after having been smeared upon a slide or cover glass and subsequently dried, or, which is more desirable, the material may be placed in a thoroughly cleansed wide-mouth bottle and sent by mail.

If cultures are necessary—and practically this is only the case where we wish to examine for the diphtheria bacillus—the specimen should be planted upon the appropriate culture medium, and then immediately sent to the laboratory; if the proper culture medium is not obtainable the physician may send the material to us in a sterilized container, or he may swab off the surface from which he wishes the culture made with a swab of sterilized cotton. A portable, sterilized swab may be easily prepared by wrapping a small piece of cotton around the end of a wire and then inserting the end upon which the cotton is fixed into a wide-mouthed bottle; it is held in place by a cotton stopper. The bottle is then wrapped in a cloth and heated in an ordinary cooking stove until the cotton begins to turn brown; it is ready for use as soon as cool. The swab is thoroughly rubbed over the surface from which the culture is to be made, replaced in the bottle and shipped to us immediately. Of course, under such circumstances, we have to make the culture after the specimen is received, and the report consequently can not be made immediately.

We examine for any pathogenic organisms, among which may be mentioned the *bacillus tuberculosis,* the *bacillus diphtheriae, the bacillus pneumoniæ, the micrococcus intracellularis meningitidis,* the *gonococcus,* the *spirocheta of syphilis,* the *streptococcus,* and the various species of *staphylococci.*

Attention should be called to the fact that the so-called *bacillus typhosus* is a germ which is exceedingly difficult to isolate. It is only possible to obtain it from the excretions from sick individuals in something like two-thirds of all cases, and only then can it be done after a prolonged series of bacteriologic manipulations. Where the patient is willing the most satisfactory results are obtained by isolating the germ from the blood, but, as the quantity required is quite considerable, it is not often that this procedure is permitted. In cases where physicians wish to test the blood for these bacteria, they should first write to the laboratory, and we will forward them a tube containing a mixture of ox-bile to which the blood should be added to prevent it from coagulating. It is next to impossible to isolate the so-called *typhoid bacillus* from water—there not being more than half a dozen instances on record where this has been accomplished.

Examination of Blood for the Malarial Parasite: In order to properly examine blood for the parasite of malaria it is necessary to spread it in a thin layer on a clean slide, and to then dry it immediately. The accompanying illustrations show the technique of the procedures necessary to accomplish this. The patient's finger is cleansed with 50 per cent. alcohol, which is allowed to dry; it is then pricked with a sharp needle which has been sterilized, preferably by heat (Fig. 2). When a small drop of blood exudes the operator touches it with the end of a slide in such a way as to transfer a small portion of the blood to it (Fig. 3); immediately this end is placed on the flattened surface of a second slide some-where near its center, and it is then pushed with a quick stroke in such a way as to smear the fluid along the surface to the second slide (Fig. 5); as soon as this is done the slide upon which the blood has been spread is vigorously waved in the air—preferably at some distance above a flame—until it is thoroughly dry. If these precautions are properly carried out the examination for the parasite can be satisfactorily made; on the other hand, if this be not done it is impossible to make accurate reports.

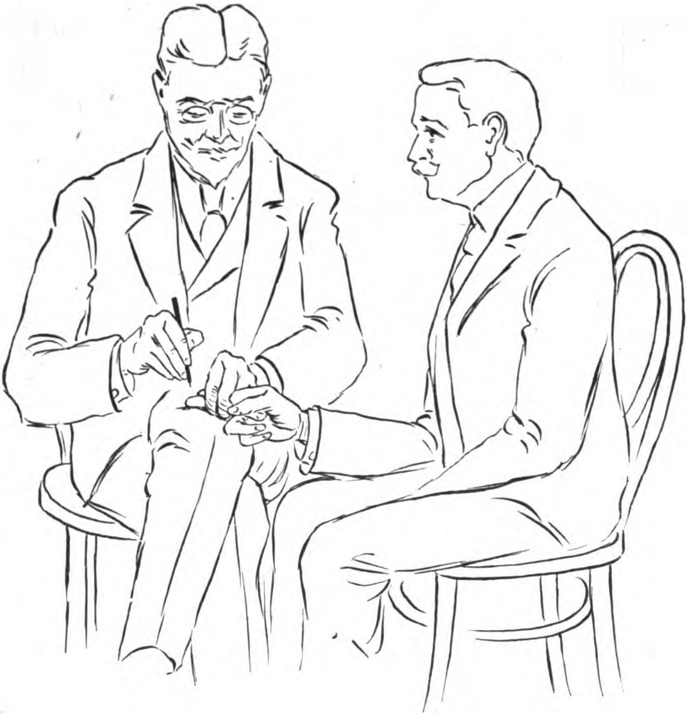

FIG. 2

Blood for the Widal test for typhoid fever: This test will at all times be cheerfully made where physicians desire it, but we feel it our duty to say that we are satisfied, for some unknown reason, that even where typhoid or paratyphoid fever exists a reaction is obtained in Georgia in a very small percentage of cases. Where the results are positive we consider this test as a good but not a diagnostic symptom of typhoid fever; if absent it means nothing.

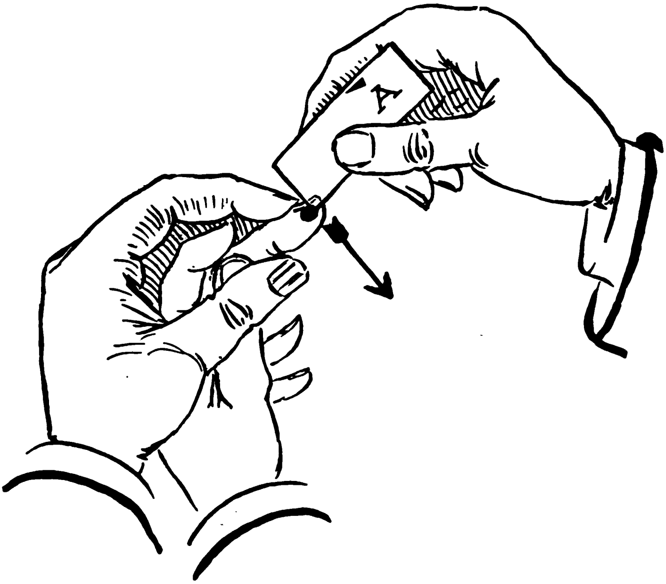

Fig. 3

In order to carry out this test, the patient's finger should be pricked with the same precaution already detailed when speaking of the method of obtaining blood for the detection of the malarial parasite. The blood may be placed upon a slide, or, what is quite as good, drops may be allowed to fall on ordinary writing paper. It is always desirable that four or five drops of blood be procured, and they should be placed at separate points on the object selected to carry them. *It is very important that the blood be allowed to dry spontaneously—never held above a flame in order to hasten this result.*

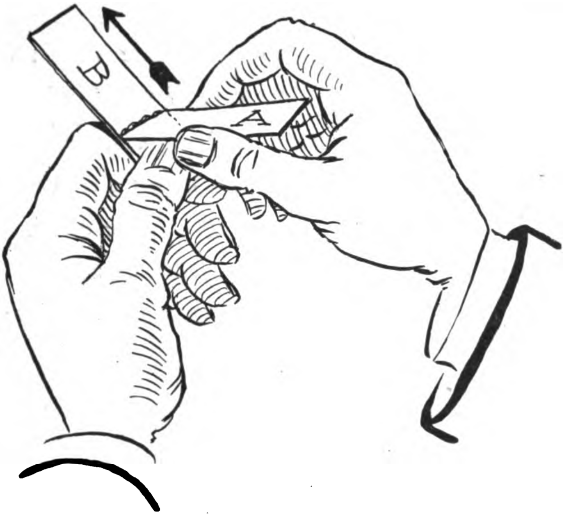

FIG. 5

Examination of the feces for animal parasites: We examine for all intestinal parasites by searching for their eggs,—this being the only sure and satisfactory method of determining as to whether or not they are present. The most important among these are the *Uncinaria americana* or hookworm, the *Oxyuris vermicularis* or pinworm, the *Ascaris lumbricoides,* the *Trichocephalus dispar,* the *Distomata,* and the various species of *Teniae* or tapeworms; we likewise examine for the embryo of the *Strongyloides intestinalis.*

All that is necessary in the preparation of specimens for examinations for intestinal parasites is to have the feces sent us in a properly stopped bottle; it is not essential to take any particular precaution in cleansing the bottle in which the specimens are sent.

Examination of water to determine its fitness for drinking purposes: Examinations of this kind require a great deal of time and work, and we are, therefore, unfortunately in the position of not being able to examine thoroughly every specimen sent us. Where it is desired to have such examinations made the Board of Health has made a ruling requiring the person who wishes such an analysis made to first communicate with the member of the State Board of Health in whose district he resides, and if the member of the board considers it necessary the examination will then be made. It is to be hoped that our appropriation will soon be increased so as to allow us to make examinations of this kind for all who may desire it.

In sending specimens of water for analysis it should always be remembered that for a satisfactory examination a considerable quantity is required, it being always best to send at least a gallon. The container in which the water is to be placed should be baked thoroughly in a stove, and, after cooling, the water to be analyzed should be poured directly into it from the primary source of the water supply. The bottle is then corked with a stopper that has likewise been sterilized. It is then placed in a vessel, ice packed around it, and the specimen sent to our laboratory as quickly as possible. It is especially to be desired where examinations of this kind are to be made that the sample be sent by some one, and not entrusted to the express company, as under such circumstances the specimens are very rarely delivered while still fit for analysis.

Physicians should always remember to place their names and addresses on the specimens sent to the laboratory, and they should also give those of the patient either on the specimen or by means of a letter or postal card.

Where it is desired reports will be made by telegraph at the expense of the physician or the patient for whom the examination is being made. Where possible we would always urge that specimens be sent by mail, as they invariably reach us sooner than when sent by express.

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